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RESEARCHING AMPHIBIAN NUMBERS IN ALBERTA (RANA): 2005 PROVINCIAL SUMMARY

Alberta Species at Risk Report No. 110

Alberta
SUSTAINABLE RESOURCE DEVELOPMENT

RESEARCHING AMPHIBIAN NUMBERS IN ALBERTA (RANA): 2005 PROVINCIAL SUMMARY

Lisa Wilkinson and Gavin Berg

Alberta Species at Risk Report No.110

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TABLE OF CONTENTS

ACKNOWLEDGEMENTS VI

EXECUTIVE SUMMARY VII

1.0 INTRODUCTION 1

2.0 STUDY AREA 2

3.0 METHODS 2

3.2 Pond Surveys 4

4.0 RESULTS 5

4.1 Pitfall Trapping 5
4.2 Pond Surveys 6
4.4 Education 11

5.0 DISCUSSION 11

6.0 LITERATURE CITED 15

7.0 APPENDICES 17

Appendix 1. Summary of historic amphibian captures at each RANA site. 18
Appendix 2. Amphibian species persistence at individual RANA sites for all years. 21

LIST OF FIGURES

Figure 1. RANA sites in Alberta 3
Figure 2. Layout of fencing and pitfall traps (A), and close-up of pitfall trap design (B) .. 3
Figure 3. Average captures per trap night (1997-2005) and persistence (2000-2005) of boreal chorus frogs 7
Figure 4. Average persistence (2001-2005) of Columbia spotted frogs 8
Figure 5. Average captures per trap night (1997-2005) and persistence (2000, 2001, 2003-2005) of northern leopard frogs 8
Figure 6. Average captures per trap night (1997-2005) and persistence (2001-2005) of wood frogs 9
Figure 7. Average captures per trap night (1997-2005) and persistence (2001-2005) of boreal toads 9
Figure 8. Average captures per trap night (1997-2005) and persistence (2001-2005) of long-toed salamanders 10
Figure 9. Average captures per trap night (1997-2005) of tiger salamanders 10

LIST OF TABLES

Table 1. Summary of amphibian species captured at all RANA sites, 2005 5
Table 2. Amphibian observations from pond surveys at RANA sites, 2005 6

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EXECUTIVE SUMMARY

Researching Amphibian Numbers in Alberta (RANA) is a province-wide program that aims to establish long-term amphibian population and distribution data while increasing public awareness of the importance of amphibians and their wetland habitat. This report summarizes results from the 2005 field season of the RANA program, and presents amphibian population trends from the history of the program. In 2005, four RANA sites were operated: Meanook Research Station, Bow Valley (Kananaskis), Cypress Hills Provincial Park and Athabasca Valley (Hinton), and two sites had limited surveys: Lesser Slave Lake Provincial Park and Saskatoon Island Provincial Park. New survey sites were established in southeastern Alberta. Eight of the ten amphibian species found in Alberta were detected: boreal chorus frog, boreal toad, Columbia spotted frog, long-toed salamander, northern leopard frog, plains spadefoot, tiger salamander and wood frog.

1.0 INTRODUCTION

In response to global declines in amphibian populations, Alberta initiated a long-term amphibian monitoring program, Researching Amphibian Numbers in Alberta (RANA), at two locations in 1997. The two primary objectives of the program are to: 1) collect long-term data on amphibian species populations in Alberta, and 2) provide public education on the importance of amphibians and wetland conservation. Since 1997, the RANA program has operated at seven sites, representing different ecoregions (Figure 1).

Because of limited resources, it is not possible to fully operate all sites every year, and as a result, methods have been modified over the last two years. Specifically, there has been increasing emphasis on pond surveys versus pitfall trapping because pond surveys provide information about population trends of multiple species over a wide geographic area (i.e., persistence of breeding populations over time). Pitfall trapping still occurs at most sites, but for shorter time periods. Capturing amphibians provides an opportunity to collect morphometric data and look for signs of disease and deformities, and provides information on the local breeding population. In the early years of the program, efforts were made to survey as many ponds as possible to identify amphibian presence and distribution. More recently, we have focused on visiting ponds with known breeding records to track persistence of populations.

In 2005, four RANA sites were monitored: Meanook Research Station (est. 1997), Bow Valley (Kananaskis; est. 1998), Cypress Hills Provincial Park (est. 1999), and Athabasca Valley (Hinton; est. 2000). Two RANA sites had limited monitoring: Lesser Slave Lake Provincial Park (est. 1997) and Saskatoon Island Provincial Park (est. 1999). In addition, amphibian surveys conducted as part of the MULTISAR project in southeastern Alberta (Downey 2006) were incorporated into the RANA program.

Only three of Alberta's ten amphibian species are considered *Secure*: the wood frog (*Rana sylvatica*), boreal chorus frog (*Pseudacris maculata*), and tiger salamander (*Ambystoma tigrinum*). The northern leopard frog (*Rana pipiens*) is *Threatened*, and the plains spadefoot toad (*Spea bombifrons*) is *May Be At Risk*. The Great Plains toad (*Bufo cognatus*) and Canadian toad (*Bufo hemiophrys*) also have a general status of *May Be At Risk*, and Alberta's Endangered Species Conservation Committee has further identified them as *Data Deficient* following detailed status reviews (Fish and Wildlife Division 2005). The long-toed salamander (*Ambystoma macrodactylum*), Columbia spotted frog (*Rana luteiventris*) and boreal (western) toad (*Bufo boreas*) are *Sensitive* (Alberta Sustainable Resource Development 2000). Alberta's Endangered Species Conservation Committee further identified the long-toed salamander as a *Species of Special Concern*, resulting in the development of a Management Plan (Fish and Wildlife Division 2005). The long-toed salamander has been the focal species in Hinton and Kananaskis owing to the provincial objective to monitor their population distribution and trends for at least five years (details are in Wilkinson and Hanus 2003). However, over the last two years we have ensured that other species have been well represented in pond surveys. Prior to 2005, all amphibian species in Alberta had been observed during the RANA program

except the Great Plains toad and the plains spadefoot because the Grassland Natural Region had not been represented in the program. Inclusion of this region in 2005 surveys resulted in detection of the plains spadefoot. There is only one record of the Canadian toad, at Lesser Slave Lake Provincial Park in 1998. Over the last two years we have added a small number of ponds in Canadian toad range to the roster of ponds surveyed, but Canadian toads have not been detected.

Public education has always been a fundamental component of the RANA program. Education takes the form of presentations, public event displays, guided hikes, school talks and other activities. Technical presentations are given to land-use managers (industry and government) and at biological conferences. In conjunction with RANA educational programs, the Alberta Volunteer Amphibian Monitoring Program (AVAMP) is promoted. This program encourages members of the public to record amphibian observations throughout the province.

This document is a compilation of 2005 field results from each RANA site, summarizing key findings and documenting amphibian trends since the inception of the program. More detailed data from the 2005 field season can be found in the individual field summary reports for each RANA site: Hinton (Berg and Wilkinson 2006), Kananaskis (Wilkinson and Berg 2006), Lesser Slave Lake Provincial Park (Wilkinson and Berg 2006), Saskatoon Island Provincial Park (Wilkinson and Berg 2006), Cypress Hills Provincial Park (Wilkinson and Berg 2006), and Meanook Biological Research Station (Wilkinson and Berg 2006).

2.0 STUDY AREA

The RANA program has sites distributed across Alberta (Figure 1) to represent a variety of natural regions (Alberta Environmental Protection 1994). Cypress Hills is located in a unique montane ecosystem within the Grassland Natural Region, Kananaskis (Bow Valley) is located in the Rocky Mountain and Foothills natural regions, Hinton (Athabasca Valley) is located in the Foothills Natural Region, and the Meanook Biological Research Station, Lesser Slave Lake Provincial Park and Saskatoon Island Provincial Park sites are located in different parts of the Boreal Forest Natural Region. A new survey area was added in 2005, in the extreme southeast corner of Alberta, representing the Grassland Natural Region.

3.0 METHODS

Standard RANA methodology for pond surveys and pitfall trapping is summarized below (refer to Wilkinson and Berg 2004 for detailed methods). Variations in these methods are included in the individual site reports.

3.1 Pitfall Trapping

At each RANA site, one pond is set up for pitfall trapping (using drift fencing and plastic pots; Figure 2), and trapping typically occurs during spring and late summer when

amphibian activity is highest (i.e., during breeding and dispersal). Data collected include: species, sex and age (when possible), length, mass, and observations about disease or deformities. Capture rates for each species at each site are compared over time.

Environmental data are tracked at all ponds, including air and water temperature, pond pH, and other ambient conditions.

Figure 1. RANA sites in Alberta.

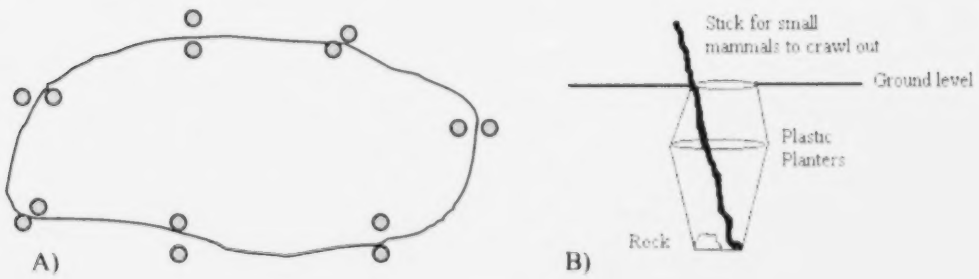

Figure 2. Layout of fencing and pitfall traps (A), and close-up of pitfall trap design (B).

3.2 Pond Surveys

Each year, at most RANA sites, a number of ponds are surveyed for the presence of breeding amphibians (surveys are not conducted at Meanook and only a small number of ponds have been surveyed at Saskatoon Island). Over the last two years, a number of ponds have been selected at each RANA site as high priorities for shoreline surveys to track the presence of breeding populations over time. Priority ponds were determined based on the existence of breeding records, ensuring that breeding ponds for all species in the area were represented. Emphasis was placed on ponds with records of species that are considered at risk or for which data are lacking. Ponds may be visited more than once to improve the likelihood of detection. When resources permit, additional ponds are surveyed.

Pond surveys are conducted to identify the presence of breeding amphibians through observations of eggs, larvae, juveniles, and young-of-the-year (adults are recorded but do not necessarily indicate breeding), as well as vocalizations. Survey efforts are most intensive during spring egg laying, although some ponds are visited later in the summer to look for larvae and dispersing young-of-the year.

During surveys, the number of frog egg masses and toad egg strings are recorded, and the number of salamander eggs is approximated with a minimum count estimate (except at a select number of ponds in the Hinton area where eggs are counted to allow for annual comparisons). The number of larvae is approximated with a minimum count estimate, and the number of individuals vocalizing is estimated using standardized categories. The number of adults and juveniles is also recorded. Environmental data are collected as per pitfall trapping ponds, and GPS locations are recorded for all ponds surveyed.

3.3 Road Transects

Surveys conducted in southeastern Alberta are road transects (i.e., listening for vocalizations), following protocol used in the MULTISAR project (Downey 2006). Target species of road transects are the Great Plains toad and the plains spadefoot. These species are difficult to detect and only breed when precipitation levels are adequate. Observers listen for three minutes every 800 m along a transect. The length of the transect varies depending on location (most transects range from approximately 19 km to 28 km). If toads are heard, the following data are recorded: species, relative abundance (according to standardized categories), direction and approximate distance of call. Ambient conditions are also noted, including wind speed, temperature, moonlight, and weather conditions (Downey 2006).

4.0 Results

4.1 Pitfall Trapping

During the 2005 season, traps were operated at the Hinton, Kananaskis, Meanook, Saskatoon Island and Cypress Hills RANA sites (trapping occurred for only three nights at Lesser Slave Lake). Trapping effort was variable between sites, and the Hinton pond was not operated in late summer owing to construction at the site. Peak breeding season appeared to have ended by the time traps were opened for the spring trapping period at Kananaskis, so traps were operated for only one week. The following species were captured: wood frogs, long-toed salamanders, boreal toads, tiger salamanders, boreal chorus frogs, northern leopard frogs, and Columbia spotted frogs (Table 1). Trapping data from Lesser Slave Lake are not included in Table 1 because traps were operated for only 3 nights (120 trap nights), and it appeared that the peak breeding season had passed by the time traps were opened. Four adult wood frogs were captured.

Table 1. Summary of amphibian species captured at all RANA sites, 2005.

Location (trapping period)	Trapping effort (# of trap nights)	Species*	Young-of-the-year (yes or no)	Capture Rate (# captured per trap night)
Saskatoon Island (May 17 – Sept 15)	1840	BCFR	Yes	0.0016
		BOTO	No	0.0049
		WOFR	Yes	0.0109
Meanook (July 5 – Aug 19)	1844	BCFR	No	0.002
		BOTO	No	0.005
		WOFR	Yes	0.24
Hinton (May 16 – May 27)	176	BOTO	N/A	0.011
		LTSA	N/A**	0.063
		WOFR	N/A**	0.023
Kananaskis (June 1 – June 8) (Aug 4 – Sept 23)	922	BOTO	Yes	0.06
		CSFR	No	0.001
		LTSA	Yes	0.49
		WOFR	Yes	0.04
Cypress Hills (May 18 – July 4) (Aug 1 – Sept 5)	2102	BCFR	No	0.0005
		NLFR	Yes	0.047
		TISA	No	0.007

*WOFR = wood frog, BOTO = boreal toad, BCFR = boreal chorus frog, LTSA = long-toed salamander, TISA = tiger salamander, NLFR = northern leopard frog, CSFR = Columbia spotted frog

**Eggs were present at trapping pond

Successful reproduction was confirmed by the presence of young-of-the-year wood frogs, northern leopard frogs, long-toed salamanders and boreal toads at, at least, one site (Table 1). Wood frog and long-toed salamander breeding was confirmed at the Hinton trapping

site by the presence of eggs. The only deformity observed was a long-toed salamander with an extra foreleg, found at the Hinton trapping pond. Summaries of average capture rates for each species for each year are in Figures 3-9. Capture rates for Columbia spotted frogs are not included because on average only one individual is captured each year at the Kananaskis trapping pond (Wilkinson and Berg 2005). Northern leopard frog (Figure 5) and long-toed salamander (Figure 8) capture rates increased, and boreal chorus frog (Figure 3) rates decreased. Wood frog (Figure 6) and boreal toad (Figure 7) capture rates decreased relative to peak years, but were otherwise similar to previous capture rates, and tiger salamander capture rates remained relatively constant (Figure 9). Refer to Appendix 1 for trapping summaries for each site for all years; details of morphological characteristics are available in individual RANA site reports.

4.2 Pond Surveys

Pond surveys were conducted at the following RANA sites: Cypress Hills, Kananaskis, Hinton and Lesser Slave Lake, although only a few ponds were surveyed at the last site. In total, 143 ponds were surveyed and six species were observed (Table 2). Wood frogs were the most ubiquitous species, being observed at 37% of all ponds surveyed within their range. The highest species diversity was recorded at both Hinton and Kananaskis with five amphibian species each (Table 2). Thirteen additional ponds were surveyed in east-central Alberta (including some call surveys conducted by volunteers) to look for Canadian toads, but none were detected.

Table 2. Amphibian observations from pond surveys at RANA sites, 2005.

RANA SITE	# of ponds surveyed	BCFR	BOTO	CATO	CSFR	LTSA	NLFR	TISA	WOFR
Cypress	42	9	n/a	n/a	n/a	n/a	14	0	n/a
Hinton	45	3	14	n/a	3	18	n/a	n/a	35
Kananaskis	43	1	14	n/a	10	12	n/a	0	17
Lesser Slave Lake	13	11	0	0	n/a	n/a	n/a	n/a	1
Total	**143**	**24**	**28**	**0**	**13**	**30**	**14**	**0**	**53**

NOTE: BCFR = boreal chorus frog, BOTO = boreal toad, CATO = Canadian toad, CSFR = Columbia spotted frog, LTSA = long toed salamander, NLFR = northern leopard frog, TISA = tiger salamander and WOFR = wood frog

n/a = indicates no prior records of this species, and not expected because RANA site is out of the species' range

The number of ponds at which amphibians were found confirms presence and provides a general indication of relative abundance. Evaluating whether species continue to breed at ponds from which there are historic breeding records provides a more reliable indication of the persistence of breeding populations. The persistence of amphibian species populations was determined by calculating the number of ponds with observations in 2005 as a percent of ponds surveyed in 2005 with previous breeding records; averages for all years are provided in Figures 3-8. Data from 2005 were omitted from two sites where fewer than five ponds were surveyed (i.e., boreal chorus frog ponds in Hinton and boreal toad ponds in Lesser Slave Lake) because sample size was deemed too low to provide meaningful data. Tiger salamander data were excluded because only one or two ponds

with breeding records have been surveyed each year, and similarly, Columbia spotted frog data from Hinton were excluded because they have only been surveyed since 2003 and the sample size is small. Refer to Appendix 2 for persistence rates for each site.

Boreal toad (Figure 7) and Columbia spotted frog (Figure 4) persistence has gradually increased, and despite a slight decrease in 2005, boreal chorus frog persistence has generally increased since a drop in 2001 (Figure 3). Northern leopard frog persistence increased from 2004, staying within the range of previous years (Figure 5). Persistence values for both wood frogs and long-toed salamanders decreased: wood frogs had the lowest persistence on record (Figure 6), and long-toed salamander persistence returned to the low value from 1999 (Figure 8).

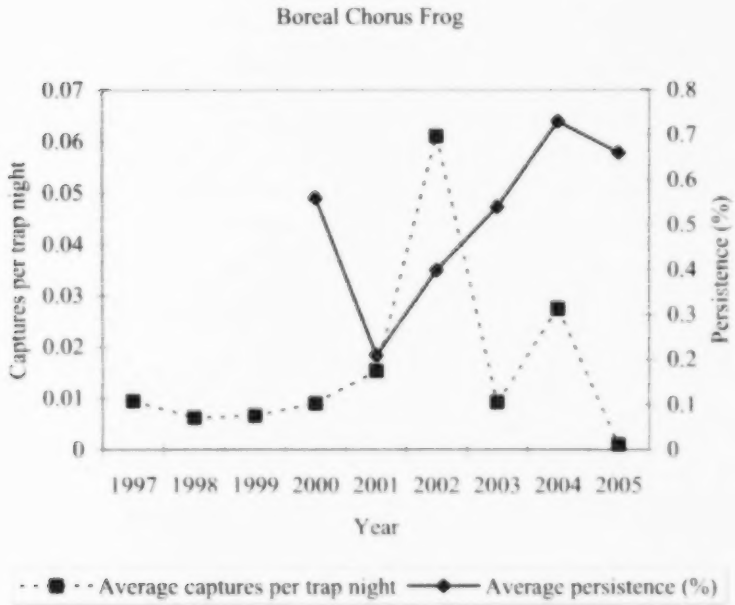

Figure 3. Average captures per trap night (1997-2005) and persistence (2000-2005) of boreal chorus frogs.

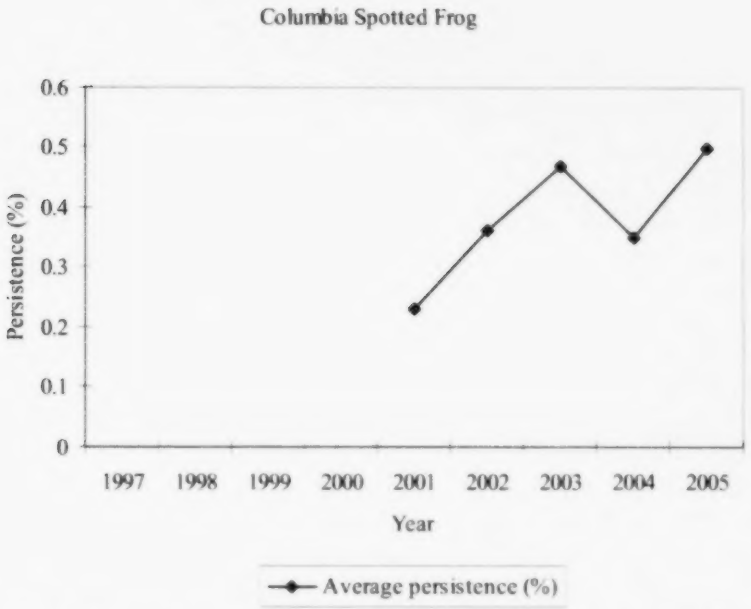

Figure 4. Average persistence (2001-2005) of Columbia spotted frogs.

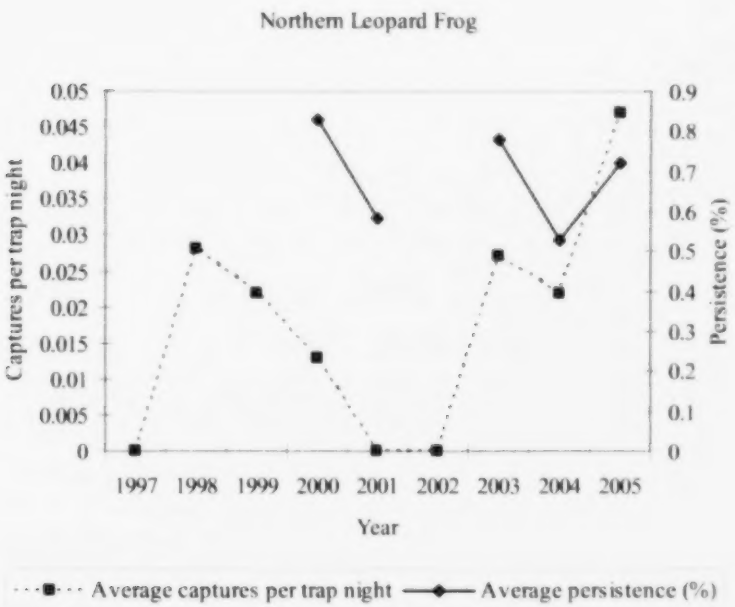

Figure 5. Average captures per trap night (1997-2005) and persistence (2000, 2001, 2003-2005) of northern leopard frogs.

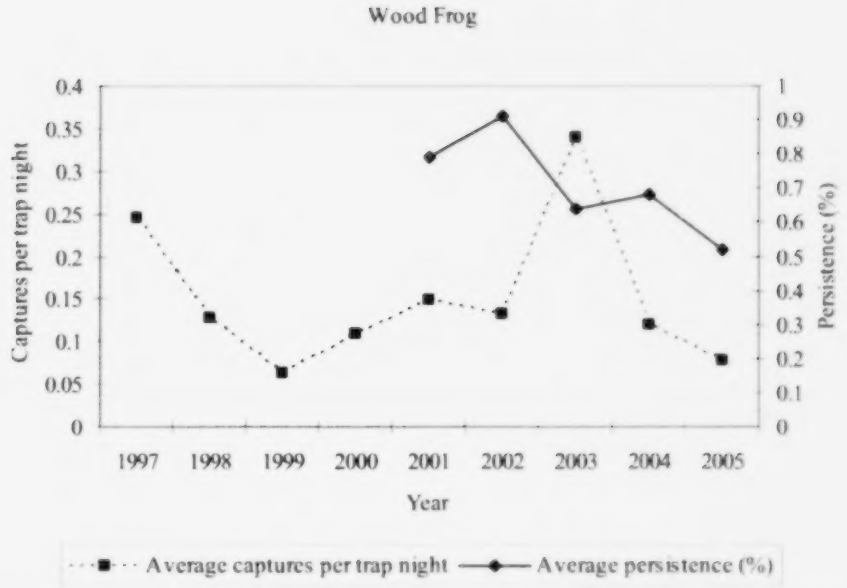

Figure 6. Average captures per trap night (1997-2005) and persistence (2001-2005) of wood frogs.

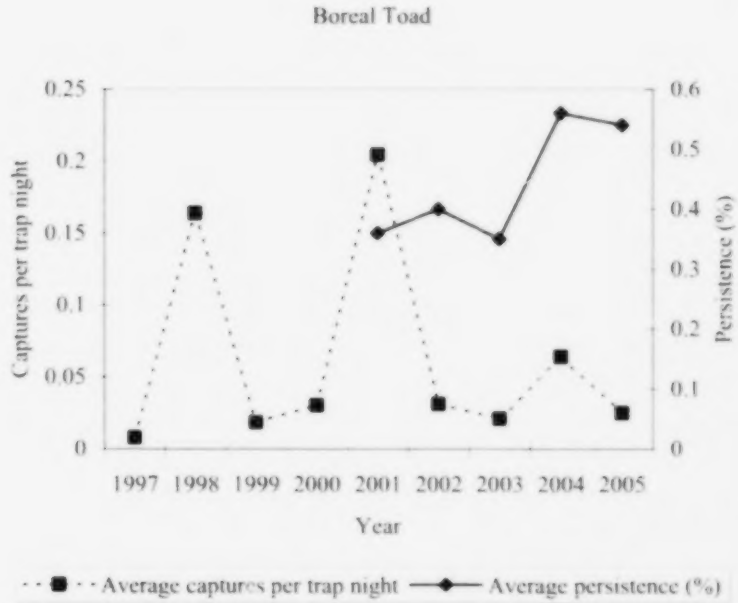

Figure 7. Average captures per trap night (1997-2005) and persistence (2001-2005) of boreal toads.

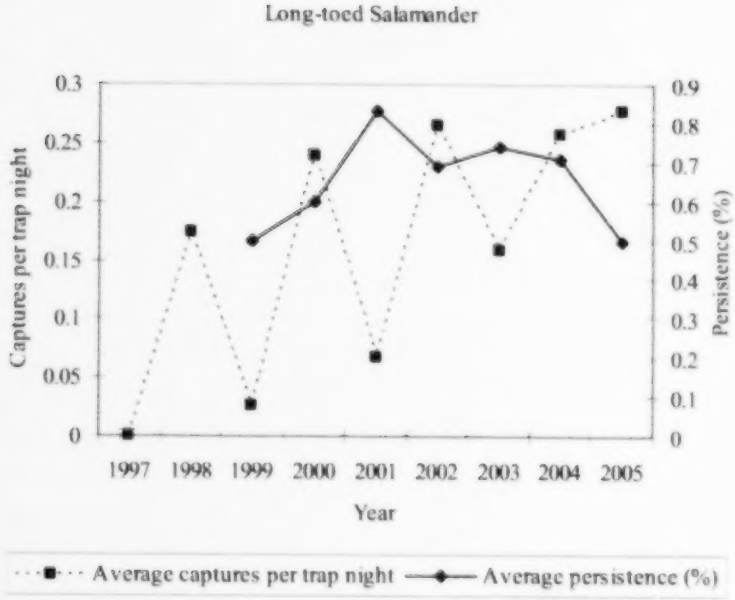

Figure 8. Average captures per trap night (1997-2005) and persistence (2001-2005) of long-toed salamanders.

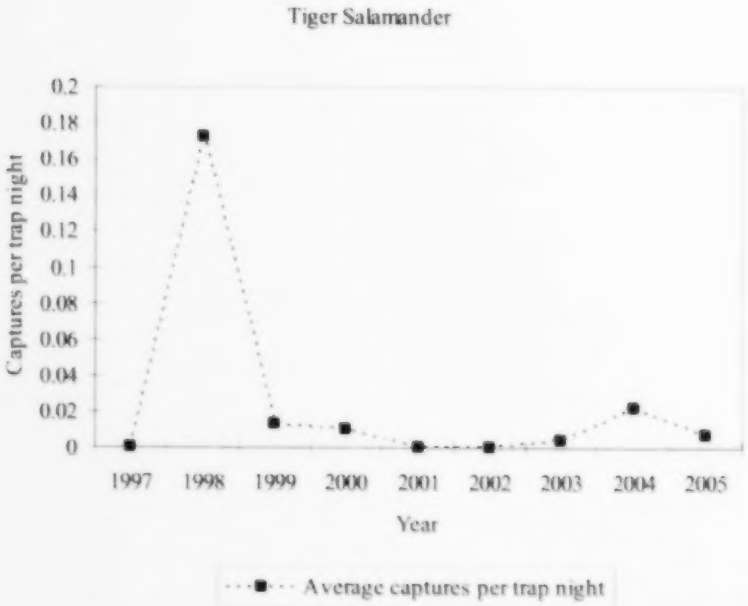

Figure 9. Average captures per trap night (1997-2005) of tiger salamanders.

4.3 Road Transects

In 2005, ten road transects were identified in southeastern Alberta for the RANA program, but only seven were surveyed because of limited time. Boreal chorus frogs were detected on six transects, and plains spadefoot were detected on four transects.

4.4 Education

The educational component of the program was reduced in 2005 because of limited resources. Cypress Hills Provincial Park was the only site with a staff member dedicated to education, where presentations, guided walks and displays reached over 1710 people. In addition, a workshop held in Kananaskis, through the G8 Legacy Chair in Wildlife Ecology, taught 16 volunteers about local amphibians and how to conduct surveys. There were also a small number of school presentations.

5.0 DISCUSSION

5.1 Overview

We are gradually gathering long-term data on Alberta's amphibians, although it is still early to make inferences about population trends because of the stochasticity inherent in amphibian populations. Throughout the RANA program, all species have exhibited population fluctuations, and distribution has been relatively consistent.

Combined results from pitfall trapping and pond surveys confirmed breeding presence of all amphibian species in at least one provincial location in 2005. Capture data revealed one deformity but no other signs of disease. Pond and call surveys detected all species except Great Plains toads, tiger salamanders, which have only been found at a small number of ponds in Cypress Hills Provincial Park, and Canadian toads, which have not been detected since 1998. Wood frogs continued to be the most ubiquitous species. In addition, all species were observed in the RANA sites in which they were expected based on current distribution records.

Persistence data revealed considerable annual variation. This is likely a function of natural population variability, which may be confounded by timing and intensity of pond surveys (thoroughness and number of visits), and number of ponds surveyed. If surveys are conducted too early or too late in the season, amphibian presence may not be obvious. Similarly, when the number of ponds sampled is low, presence (or absence) at all ponds tends to inflate (or deflate) estimates, and results in misleading conclusions. It is also difficult to detect meaningful changes in the population trend when occurrences are consistently low. Interpretation of the results must consider sample size and timing of surveys, and future evaluation of persistence should focus on species for which sampling history is adequate.

5.2 Species Accounts

Long-toed Salamander

Long-toed salamanders have been the focus of monitoring efforts in Kananaskis and Hinton because of their *Sensitive* status. Capture rates have fluctuated and varied between sites. In particular, recruitment of young-of-the-year salamanders at the Hinton pond has declined significantly (and there may not be any recruitment in 2005 because of construction at the pond), while the population at the Kananaskis pond appears relatively stable (Wilkinson and Berg 2005). It is important to determine whether the decline at the Hinton pond is a localized event, possibly as a result of reduced water levels and changes in water quality, or representative of changes throughout the region. Persistence of breeding salamanders declined in 2005, after four relatively stable years. The decline could be due, in part, to the timing of surveys in Kananaskis, which occurred after most eggs had hatched and larvae had dispersed. Only in ponds with clear water and lacking vegetation can salamander larvae be readily observed. However, evidence from selected ponds within the Kananaskis region suggests that human development and recreational activities (e.g., ATVs, dog walking) are negatively affecting some salamander breeding sites. In addition, fish stocking reduces or eliminates breeding salamanders and other amphibians from established breeding ponds (Pearson 2004, Rose 2004). It appears that long-toed salamander populations may be stable in some parts of the species' range, but are vulnerable to human pressure. We lack long-term studies on the effects of various types of industrial and agricultural activities and must therefore take a conservative approach to protecting salamander habitat.

Tiger Salamander

Cypress Hills is the only RANA site where tiger salamanders have been captured, and with the exception of 1998, captures have remained relatively low but constant. Few tiger salamanders have been recorded during pond surveys, and only one or two ponds with breeding records have been surveyed each year. Survey data may be indicative of a small population; however, tiger salamanders can also be difficult to detect. Pond surveys should be conducted during the egg laying period to maximize chances of detection. It will be difficult to detect meaningful changes in tiger salamander populations because of their low occurrence rate.

Northern Leopard Frog

Northern leopard frogs have been the focal species at the Cypress Hills Provincial Park RANA site because of their *Threatened* status. Unfortunately, monitoring was suspended in 2001 and 2002 because of insufficient resources. Capture rates have fluctuated considerably, but reached their highest level in 2005, after two years of trap modifications. This increase may be directly attributable to improved capture efficiency (in 2004 trapping was compromised by muskrats damaging the drift fencing around the pond; Berg and Froyman 2004). Young-of-the-year continue to constitute a significant proportion of the captures, confirming a successful breeding population. Persistence has fluctuated within the range of 0.53% to 0.83%, and continued monitoring is recommended; early indications suggest that the population may be stable in the provincial park.

Wood Frog

Wood frog capture rates have remained relatively constant. Persistence has fluctuated and followed a downward trend, which is an unexpected result for a relatively common species. The low detection rate of wood frogs may be due in part to the lateness of surveys in Lesser Slave Lake; wood frogs breed early in the year and once eggs have hatched and tadpoles dispersed throughout the pond they become more difficult to detect, especially in ponds with lots of vegetation or murky conditions. It is essential to continue monitoring the populations of common species, such as wood frogs, because they are excellent indicators of changes in wetland quality and amphibian population declines; declines in less common species are more difficult to detect.

Boreal Chorus Frog

Boreal chorus frog capture rates show an interesting trend: the first five years were relatively constant, followed by alternating high and low capture rates, with the lowest rate on record in 2005. Lesser Slave Lake is the RANA site responsible for the majority of boreal chorus frog captures, so poor trapping success at the site is reflected in the provincial average. The late trapping session in Lesser Slave Lake, which missed peak breeding and did not capture any boreal chorus frogs, likely contributed to the low values in 2005. Similarly, the trapping period in 2003 may have missed the peak breeding period (since 2003, limited resources have constrained field work at Lesser Slave Lake). It has become increasingly apparent that boreal chorus frogs can sometimes escape pitfall traps and, consequently, may be under-represented. In areas where boreal chorus frog populations are generally low, population estimates will be confounded by poor trapping success. Fortunately, pond persistence has generally gone up, suggesting that populations are breeding successfully and that capture rate declines may be an artifact of poorly timed trapping periods. However, despite their apparently common status, we lack comprehensive data on boreal chorus frogs and should be cautious when interpreting population trend data.

Columbia Spotted Frog

Capture records of Columbia spotted frogs have rarely exceeded one individual per year, and they have only been captured at the Kananaskis trapping pond (the only trapping pond within their range). Nevertheless, they have been regularly detected during pond surveys in Kananaskis, showing a gradual increase in persistence. Columbia spotted frogs have recently been found in higher elevations near Hinton, but the small sample size and short monitoring history do not provide enough data to assess persistence. Future survey efforts should ensure that these ponds are monitored to track persistence. We have limited data on Columbia spotted frogs, a *Sensitive* species with a restricted range in Alberta.

Boreal Toad and Canadian Toad

Boreal toads have been observed regularly throughout the RANA program, occasionally exhibiting large population fluctuations, as evidenced by peaks in otherwise constant capture rates. Although boreal toads appear to be relatively widespread and persistence rates have been increasing in Alberta, we lack information on their habitat requirements. Declines have been observed in other parts of their range in North America, and for this

reason, boreal toads have been placed on the IUCN Red List as *Near Threatened* (IUCN 2001).

Canadian toads continue to be absent from RANA surveys, and there are concerns that they may be declining in east-central Alberta. Surveys in northeastern Alberta (i.e., Fort McMurray area), however, regularly detect Canadian toads, particularly in areas with sandy soil substrates (N. MacDonald, pers. comm.). The paucity of Canadian toads in east-central Alberta may be related to the eastward expansion of boreal toads, although further research is required to substantiate this. Pond surveys conducted in 2004 and 2005 in east-central Alberta did not yield observations of Canadian toads (Wilkinson and Berg 2005, this report), although timing of the surveys may not have been appropriate, and it can be difficult to distinguish boreal and Canadian toad eggs and tadpoles. Future survey efforts should focus on trying to detect vocalizations during spring. The Canadian toad should be a priority species for surveying and monitoring: it is considered *May Be At Risk* because anecdotal information suggests that it may be declining in parts of its range in Alberta, and it has also been designated as *Data Deficient*, because we currently lack adequate data to substantiate its status.

Plains Spadefoot and Great Plains Toad

The addition of road transects in southeastern Alberta corrects the previous omission of the grassland ecosystem from the RANA program. Tracking persistence of the two toad species in the grasslands is important given their *May Be At Risk* status in Alberta, and the Great Plains toad's designation of *Data Deficient*. Although only plains spadefoot were detected on designated RANA transects, Great Plains toads were heard during other surveys conducted as part of the MULTISAR project, in the northern range of the study area (Downey 2006). The ability to detect these toad species is limited by precipitation levels, such that surveys can only be conducted in years when precipitation levels are high enough to support breeding. Because of this, it will take more time than for other species to collect sufficient data to detect population trends.

5.3 Review of Methods: Current and Future Considerations

The provincial summaries of capture rates over time provide a broad-scale overview of capture trends and should not be interpreted on their own as population trends. The real value in trapping data is in reviewing data at each site, looking for continued evidence of breeding, and looking for signs of potential changes in population health, such as disease, deformity, or sudden declines in abundance. One of the difficulties with comparing capture rates over time is that the timing and length of trapping periods may vary from year to year depending on availability of field staff and weather conditions (i.e., initiation of spring trapping depends on timing of ice melt and can be delayed by spring snow storms). Standardizing the trapping period in an attempt to make annual comparisons can be problematic because the onset of breeding varies depending on when suitable spring conditions exist - conditions that vary considerably by location and year. In addition, if traps are operated beyond peak activity periods, capture rates will be lowered. The only way to accurately compare capture rates over time is to do a post-hoc evaluation of suitable trapping periods and adjust the capture rates accordingly; however, there will

still be inaccuracies with this approach. For the purpose of this provincial overview, a review of unadjusted capture rates was deemed sufficient, in conjunction with confirmation of breeding and notation of key observations. Pond survey data (and road transect data in the southeast) are more instructive to provide information on population trends throughout the province.

In the future, RANA should focus on pond surveys to track persistence of breeding amphibians, with emphasis on species at risk and species for which data are lacking. A minimum number of breeding ponds for each species at designated RANA sites should be surveyed, with emphasis on spring and early summer when evidence of breeding can be confirmed by vocalizations, eggs and larvae (repeat visits are necessary if amphibians are not detected on the first survey). Consistency in timing of surveys will improve the reliability of results. In southeastern Alberta, road transects should be conducted when precipitation levels are deemed adequate for breeding toads. Road transects and/or pond surveys to detect Canadian toad vocalizations should be established in east-central Alberta. Late summer surveys may be appropriate in some locations to detect dispersing young-of-the-year.

Ideally, priority ponds will be surveyed annually, but if resources are limited, a rotating survey schedule should be established to ensure that ponds are surveyed at least every three years. Owing to logistical constraints (i.e., adequate funding and availability of adequately trained personnel), pitfall trapping should continue on a limited basis, and may need to be conducted on a rotating basis as with pond surveys. Renewed efforts are required to fulfill the education objectives of the RANA program.

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7.0 APPENDICES

Appendix 1. Summary of historic amphibian captures at each RANA site.

A -Beaverhill Lake				
Year	**# Trap Nights**	**BCFR*** Total # caught (# caught per trap night)	**TISA*** Total # caught (# caught per trap night)	**WOFR*** Total # caught (# caught per trap night)
1998	2073	17 (0.008)	1 (0.000)	182 (0.089)
1999	1257	1 (0.001)	1 (0.001)	111 (0.088)
2000	186	2 (0.011)	0 (0.000)	14 (0.075)

*BCFR (Boreal Chorus Frog), TISA (Tiger Salamander), WOFR (Wood Frog).

B –Cypress Hills Provincial Park				
Year	**# Trap Nights**	**BCFR*** Total # caught (# caught per trap night)	**NLFR*** Total # caught (# caught per trap night)	**TISA*** Total # caught (# caught per trap night)
1998	180	2 (0.011)	5 (0.028)	31 (0.172)
1999	927	4 (0.004)	20 (0.022)	12 (0.013)
2000	1440	2 (0.001)	19 (0.013)	15 (0.010)
2001	N/A	N/A	N/A	N/A
2002	N/A	N/A	N/A	N/A
2003	2629	2 (0.00076)	71 (0.027)	10 (0.0038)
2004	2742	1 (0.0004)	61 (0.022)	58 (0.022)
2005	**2102**	**1 (0.0005)**	**98 (0.047)**	**15 (0.007)**

*BCFR (Boreal Chorus Frog), NLFR (Northern Leopard Frog), TISA (Tiger Salamander).

C –Hinton and area				
Year	**# Trap Nights**	**BOTO*** Total # caught (# caught per trap night)	**LTSA*** Total # caught (# caught per trap night)	**WOFR*** Total # caught (# caught per trap night)
2000	743	44 (0.058)	135 (0.180)	346 (0.468)
2001	1072	13 (0.012)	161 (0.150)	69 (0.064)
2002	1150	19 (0.017)	218 (0.190)	150(0.130)
2003	946	10 (0.011)	108 (0.11)	54 (0.057)
2004	1078	35 (0.033)	123 (0.115)	41 (0.038)
2005	**176**	**2 (0.011)**	**11 (0.063)**	**5 (0.028)**

*BOTO (Boreal Toad), LTSA (Long-toed Salamander), WOFR (Wood Frog).

Appendix 1 (Cont.). Summary of historic amphibian captures at each RANA site.

D –Kananaskis and area					
Year	**# Trap Nights**	**BOTO*** Total # caught (# caught per trap night)	**CSFR*** Total # caught (# caught per trap night)	**LTSA*** Total # caught (# caught per trap night)	**WOFR*** Total # caught (# caught per trap night)
1998	1068	33 (0.031)	7 (0.007)	186 (0.174)	61 (0.057)
1999	383	11 (0.029)	2 (0.005)	10 (0.026)	12 (0.031)
2000	522	3 (0.006)	0 (0.000)	6 (0.011)	3 (0.006)
2001	484	11 (0.023)	1 (0.002)	34 (0.070)	8 (0.017)
2002**	1363	39 (0.029)	3 (0.002)	465 (0.341)	213 (0.156)
2003	1072	27 (0.03)	1 (0.0009)	283 (0.26)	218 (0.2)
2004	544	13 (0.024)	0 (0.000)	217 (0.399)	26 (0.048)
2005	**922**	**47 (0.06)**	**1 (0.01)**	**385 (0.49)**	**32 (0.04)**

* BOTO (Boreal Toad), CSFR (Columbia Spotted Frog), LTSA (Long-Toed Salamander), WOFR (Wood Frog).

**In 2002 a new RANA trapping site was established, Kuhn's Pond, because the original trapping pond dried up in 3 consecutive years.

E –Lesser Slave Lake Provincial Park				
Year	**# Trap Nights**	**BCFR*** Total # caught (# caught per trap night)	**BOTO*** Total # caught (# caught per trap night)	**WOFR*** Total # caught (# caught per trap night)
1997	724**	8 (0.011)	7 (0.010)	73 (0.101)
1998***	3456	5 (0.001)	23 (0.007)	33 (0.001)
1999	3312	57 (0.017)	114 (0.034)	119 (0.036)
2000	3216	26 (0.008)	84 (0.026)	52 (0.016)
2001	840	29 (0.035)	817 (0.973)	83 (0.099)
2002	1680	299 (0.178)	156 (0.093)	196 (0.117)
2003	1360	52 (0.0038)	67 (0.049)	809 (0.59)
2004	970	130 (0.134)	254 (0.262)	228 (0.235)
2005	**120**	**0**	**0**	**4 (0.033)**

*BCFR (Boreal Chorus Frog), BOTO (Boreal Toad), WOFR (Wood Frog).

**The number of trap nights is an estimate due to difficulties interpreting the number of trap malfunctions in original data.

***One Canadian toad was captured in 1998.

Appendix 1 (Cont.). Summary of historic amphibian captures at each RANA site.

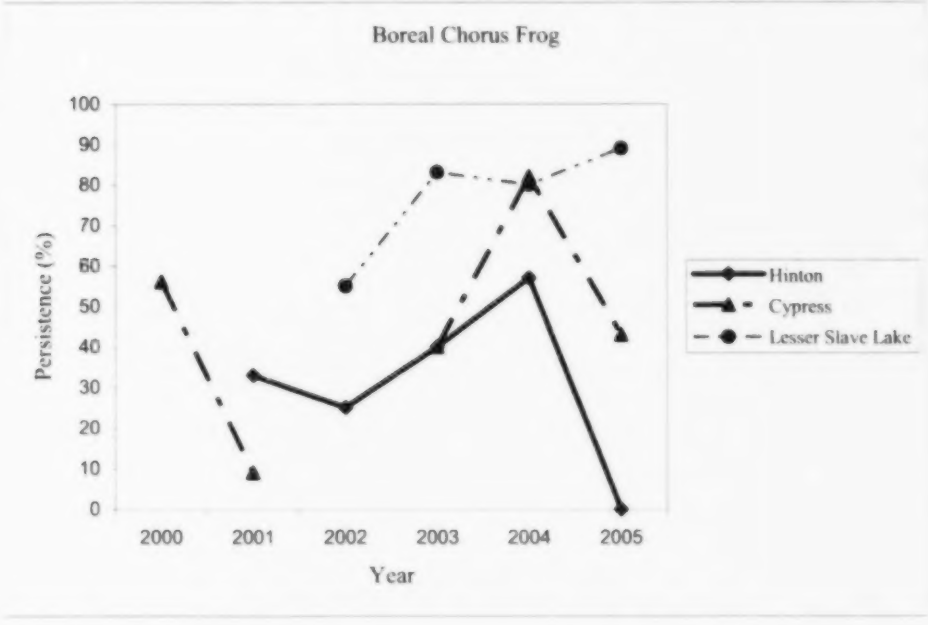
F–Meanook Biological Research Station				
Year	**# Trap Nights**	**BCFR*** **Total # caught (# caught per trap night)**	**BOTO*** **Total # caught (# caught per trap night)**	**WOFR*** **Total # caught (# caught per trap night)**
1997	518	4 (0.008)	3 (0.006)	193 (0.387)
1998	755	4 (0.005)	343 (0.454)	277 (0.367)
1999	630	2 (0.003)	7 (0.011)	23 (0.037)
2000	2090	6 (0.003)	125 (0.06)	36 (0.017)
2001	644	4 (0.006)	8 (0.012)	316 (0.49)
2002	714	1 (0.001)	12 (0.017)	65 (0.091)
2003	1571	16 (0.01)	23 (0.015)	982 (0.63)
2004	1440	4 (0.004)	3 (0.002)	310 (0.215)
2005	**1844**	**3 (0.002)**	**10 (0.005)**	**447 (0.24)**

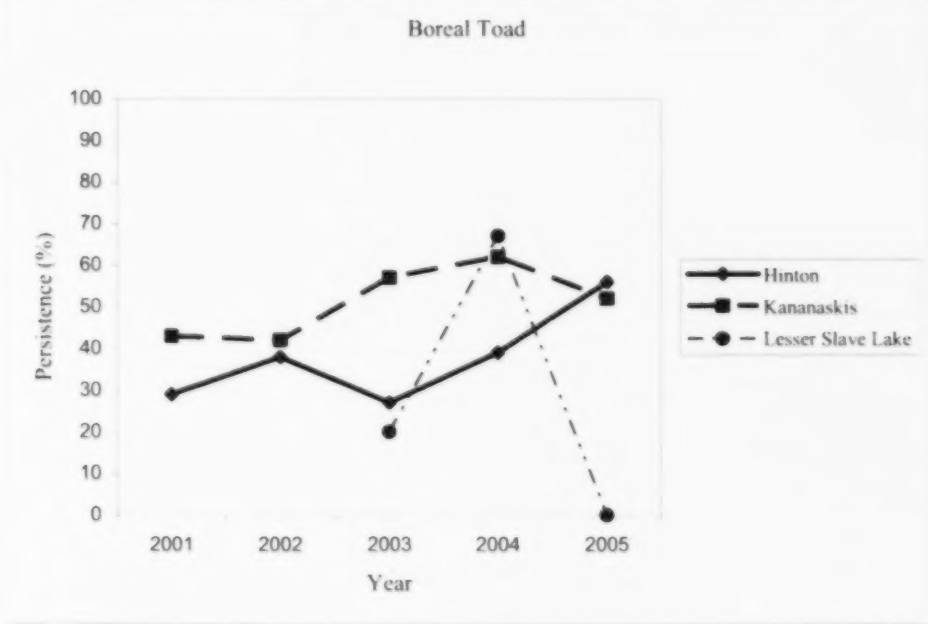
*BCFR (Boreal Chorus Frog), BOTO (Boreal Toad), WOFR (Wood Frog).

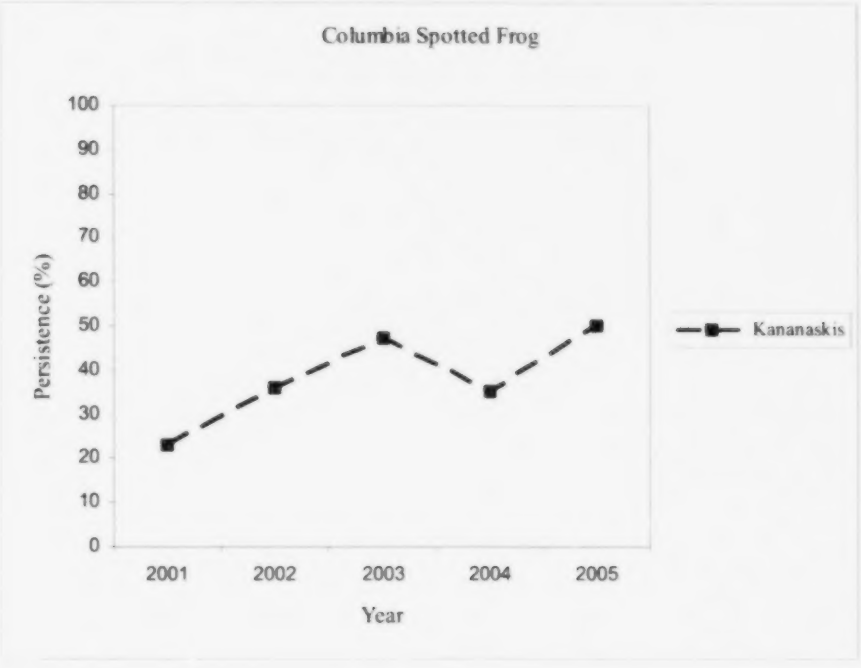
G–Saskatoon Island Provincial Park				
Year	**# Trap Nights**	**BCFR*** **Total # caught (# caught per trap night)**	**BOTO*** **Total # caught (# caught per trap night)**	**WOFR*** **Total # caught (# caught per trap night)**
1999	1070	9 (0.008)	0 (0.000)	128 (0.120)
2000	1081	17 (0.016)	2 (0.002)	44 (0.041)
2001	996	5 (0.005)	3 (0.003)	74 (0.074)
2002	980	4 (0.004)	0 (0.000)	165 (0.168)
2003	808	11 (0.014)	0 (0.000)	177 (0.22)
2004	880	0 (0.000)	0 (0.000)	49 (0.056)
2005	**1840**	**3 (0.0016)**	**9 (0.0049)**	**20 (0.0109)**

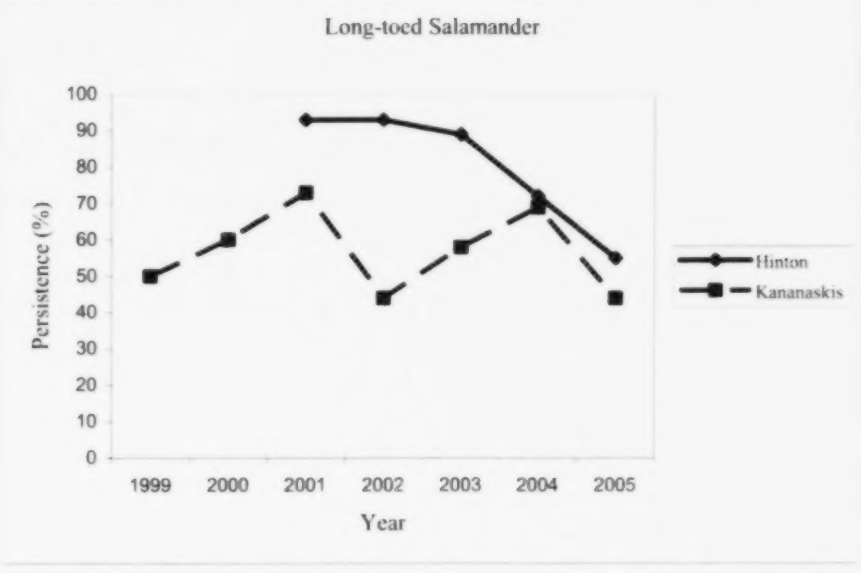
*BCFR (Boreal Chorus Frog), BOTO (Boreal Toad), WOFR (Wood Frog).

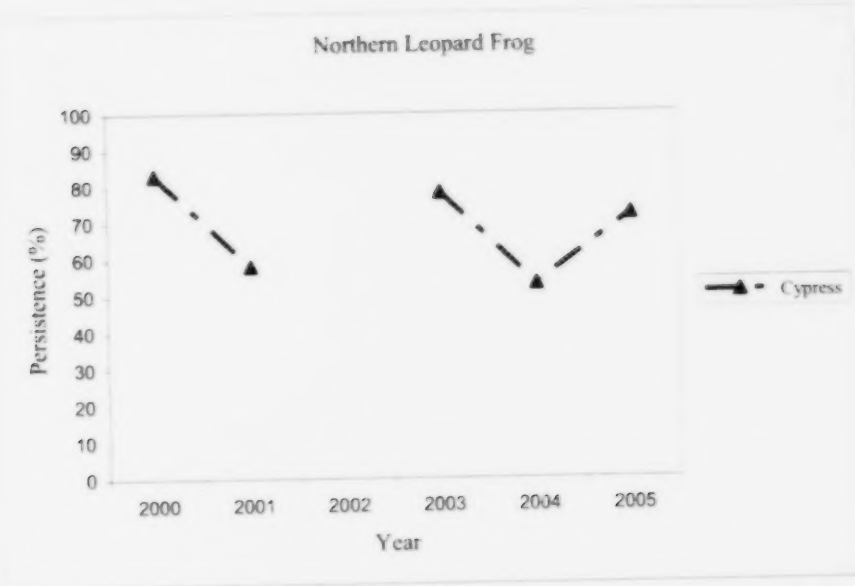
Appendix 2. Amphibian species persistence at individual RANA sites for all years.

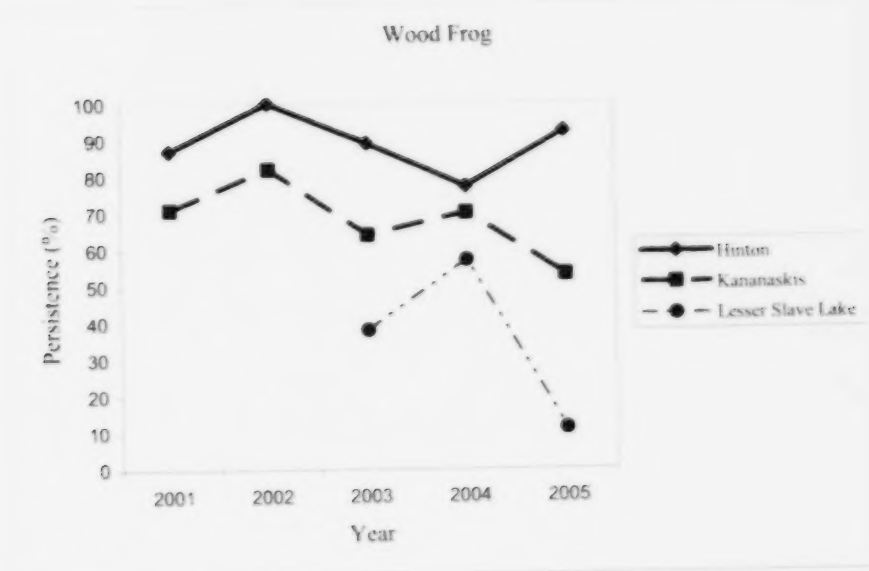





Columbia Spotted Frog
Persistence (%)
100
90
80
70
60
50
40
30
20
10
0
2001
2002
2003
2004
2005
Year
Kananaskis


Long-toed Salamander
Persistence (%)
100
90
80
70
60
50
40
30
20
10
0
1999
2000
2001
2002
2003
2004
2005
Year
Hinton
Kananaskis


Northern Leopard Frog
Persistence (%)
100
90
80
70
60
50
40
30
20
10
0
2000
2001
2002
2003
2004
2005
Year
Cypress


Wood Frog
Persistence (%)
100
90
80
70
60
50
40
30
20
10
0
2001
2002
2003
2004
2005
Year
Hinton
Kananaskis
Lesser Slave Lake

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